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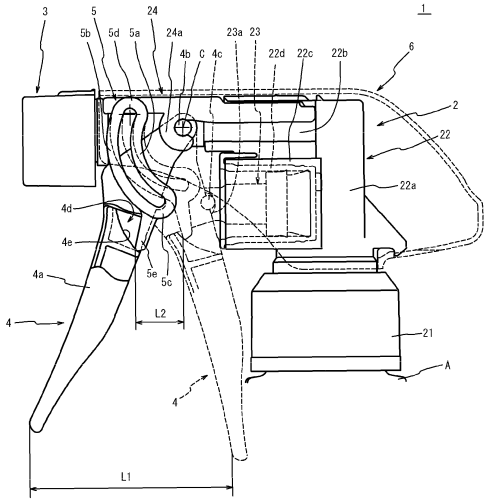
(54) TRIGGER TYPE LIQUID EJECTOR

(57) There is provided a trigger-type liquid sprayer in which a spring member urging an operation lever is less likely to be fatigued.

A trigger-type liquid sprayer according to the present invention includes a sprayer main body (2) attached to a container (A), an operation lever (4) held to be swingable in a front-back direction with respect to the sprayer main body (2), and a spring member (5) urging the operation lever (4) forward. The spring member (5) includes a fixed part (5d) that is located in front of a swing center (C) of the operation lever (4) and is fixed and held to the sprayer main body (2), and a projection (5e) that is located below the fixed part (5d). The operation lever (4) includes an inclined surface (4e) that is inclined upward from downward and frontward from backward and is urged by the projection (5e) abutting against the inclined surface (4e).

[Fig. 1]



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Description

Technical Field

[0001] The present invention relates to a trigger-type liquid sprayer that is attached to a container storing a content liquid and sprays the content liquid by swinging an operation lever in a front-back direction.

Background Art

[0002] For containers storing a content liquid such as a mold remover, a detergent, an air freshener, a repellent, an agricultural chemical, and a chemical, a trigger-type liquid sprayer has been widely used (for example, see Patent Literature 1). The trigger-type liquid sprayer is attached to a mouth part of the container and sprays the liquid in the container in the form of a straight jet, mist, or foam by actuation of a pump provided in a sprayer main body, in response to swinging of an operation lever in a front-back direction, thereby allowing efficient supply of the content liquid.

[0003] As shown in Fig. 3, a conventional trigger-type liquid sprayer 100 includes a sprayer main body 102 attached to a container 101, an operation lever 103 held swingably in a front-back direction with respect to the sprayer main body 102, and a spring member 104 urging the operation lever 103 forward. Here, a projection (spring-side projection 105) is provided on a lower part of the spring member 104, whereas a projection (lever-side projection 106) located in front of the spring-side projection 105 is provided on the operation lever 103. When the operation lever 103 is swung backward, a back end part of the lever-side projection 106 presses a front wall of the spring-side projection 105 to elastically deform the spring member 104, so that the operation lever 103 is urged forward by elastic force generated by the elastic deformation.

Citation List

Patent Literature

[0004] Patent Literature 1: JP 2017-170281 A

Summary of Invention

Technical Problem

[0005] When the operation lever 103 is swung back and forth, the spring-side projection 105 is moved in a front-back direction together with the lever-side projection 106 because the movement of the spring-side projection 105 in the front-back direction is restricted by the lever-side projection 106. For this reason, when the range in which the operation lever 103 is swung in the front-back direction is to be widened as in a case of spraying a relatively large amount of a content liquid, the spring-side projection 105 is also moved largely in the front-back direction. As a result, the amount of deformation of the spring member 104 is increased and the spring member 104 is easily fatigued.

[0006] The present invention has been achieved in order to solve such a problem, and an object of the present invention is to provide a trigger-type liquid sprayer in which a spring member is less likely to be fatigued as compared to a conventional case.

Solution to Problem

[0007] The present invention provides a trigger-type liquid sprayer including a sprayer main body attached to a container, an operation lever held to be swingable in a front-back direction with respect to the sprayer main body, and a spring member urging the operation lever forward, the trigger-type liquid sprayer sucking, pressurizing, and pumping a content liquid stored in the container to spray the content liquid to outside by swinging the operation lever in the front-back direction so as to actuate a pump provided in the sprayer main body, in which the spring member includes a fixed part that is located in front of a swing center of the operation lever and is fixed and held to the sprayer main body, and a projection that is located below the fixed part, and the operation lever includes an inclined surface that is inclined upward from downward and frontward from backward and is urged by the projection abutting against the inclined surface.

[0008] The inclined surface is preferably a curved inclined surface that is curved in a direction away from the projection.

Advantageous Effects of Invention

[0009] The trigger-type liquid sprayer according to the present invention is configured such that the urging force of the spring member acts on the operation lever by the projection provided on the spring member abutting against the inclined surface provided in the operation lever. When the operation lever is swung, the projection abutting against the inclined surface moves backward together with the inclined surface while moving relatively forward with respect to the inclined surface. Consequently, the amount of movement in the front-back direction is reduced as compared to a conventional case, and thus the amount of deformation of the spring member can be reduced. Therefore, the spring member can be less likely to be fatigued as compared to a conventional trigger-type liquid sprayer.

Brief Description of Drawings

[0010]

Fig. 1 is a view showing a relationship between an operation lever and a spring member in an embod-

iment of a trigger-type liquid sprayer according to the present invention.

Fig. 2(a) is a partial cross-sectional view of the operation lever shown in Fig. 1, taken along a line B-B shown in Fig. 2(c), Fig. 2(b) is a side view of the operation lever shown in Fig. 1, and Fig. 2(c) is a rear view of the operation lever shown in Fig. 1.

Fig. 3 is a view showing a relationship between an operation lever and a spring member in a conventional trigger-type liquid sprayer.

Description of Embodiments

[0011] Hereinafter, an embodiment of a trigger-type liquid sprayer according to the present invention will be described with reference to Fig. 1. In the present specification and the like, "upward" is a side on which a cover part indicated by reference numeral 24 is disposed with respect to an attachment cap indicated by reference numeral 21 in Fig. 1, and "downward" is the opposite side. Further, "frontward" is a side (left side in Fig. 1) on which a nozzle indicated by reference numeral 3 is disposed with respect to a vertical cylinder part indicated by reference numeral 22a, and "backward" is the opposite side (right side in Fig. 1). "Side direction" is a left-right direction as viewed from the front toward the back (direction orthogonal to drawing in Fig. 1).

[0012] Reference numeral 1 shown in Fig. 1 indicates an embodiment of the trigger-type liquid sprayer according to the present invention. The trigger-type liquid sprayer 1 generally includes a sprayer main body 2, the nozzle 3, an operation lever 4, a spring member 5, and a shroud 6.

[0013] The sprayer main body 2 includes the attachment cap 21 for fixing and holding the trigger-type liquid sprayer 1 at a mouth part of a container A. Although not shown, a male screw part is provided on an outer peripheral surface of the mouth part of the container A, and a female screw part is provided on an inner peripheral surface of the attachment cap 21. By rotating the attachment cap 21 with respect to the mouth part and screwing the female screw part into the male screw part, the sprayer main body 2 is fixed and held in the container A. In order to fix and hold the sprayer main body 2 in the container A, other means such as an undercut may be adopted.

[0014] The sprayer main body 2 also includes a passage part 22 having an internal passage through which a content liquid stored in the container A passes. The passage part 22 includes the vertical cylinder part 22a extending upward from downward and a horizontal cylinder part 22b extending forward from an upper end of the vertical cylinder part 22a. A cylindrical part 22c with an open front is provided at an intermediate part of the vertical cylinder part 22a in a vertical direction. A cylinder 22d is fitted and held into the cylindrical part 22c.

[0015] A piston member 23 that slides in an air-tight and liquid-tight manner with respect to an inner peripheral surface of the cylinder 22d is provided inside the cylinder 22d. The cylinder 22d and the piston member 23 function as a pump that introduces the content liquid stored in the container A in the internal passage of the passage part 22 and sprays the content liquid to the outside. By moving the piston member 23 in the front-back direction, the content liquid can be sucked, pressurized, and pumped. A connection recess part 23a connected to the operation lever 4 is provided at a front end part of the piston member 23.

[0016] The sprayer main body 2 also includes the cover part 24 disposed above the horizontal cylinder part 22b. A C-shaped bearing part 24a with an open back is provided on both sides of the cover part 24.

[0017] The nozzle 3 attached to the horizontal cylinder part 22b is provided in front of the cover part 24. Although not shown, a spray port for spraying the content liquid having passed through the internal passage of the passage part 22 and an impact plate located at the front of the spray port are provided on a front end part of the nozzle 3. As the content liquid from the spray port collides with the impact plate, the spray form of the content liquid is changed by the impact plate. By appropriately selecting a shape, the content liquid can be sprayed to the outside in the form of a mist or foam. The spray plate is arbitrarily provided, and the content liquid may be sprayed directly from the spray port. Further, the nozzle 3 is provided rotatably with respect to the horizontal cylinder part 22b, and can open and close the spray port according to a rotation angle.

[0018] The operation lever 4 is attached to the bearing part 24a of the cover part 24. The operation lever 4 includes a lever main body part 4a that is a part on which a finger is put during an operation. Further, as shown in Fig. 2, a pair of shaft parts 4b each having a columnar shape and projecting laterally outward are provided on an upper part of the lever main body part 4a. The shaft part 4b is supported by the bearing part 24a as shown in Fig. 1, and the operation lever 4 can swing in the front-back direction around a center (swing center C) of the shaft part 4b. A pair of connection shaft parts 4c each inserted into the connection recess part 23a of the piston member 23 are provided on a back part of the lever main body part 4a.

[0019] As shown in Fig. 2, a recess part 4d that opens backward is provided in an intermediate part of the operation lever 4 in the vertical direction. An inclined surface 4e that is inclined upward from downward and frontward from backward is provided inside the recess part 4d. The inclined surface 4e of the present embodiment is provided as a curved inclined surface that is curved in a direction away from a projection 5e of the spring member 5 to be described later (direction away from shaft part 4b). As shown in Fig. 2(c), the recess part 4d and the inclined surface 4e are respectively provided in pairs in the operation lever 4.

[0020] The cover part 24 includes paired spring members 5 provided on both sides in front of the bearing part 24a. The spring member 5 includes a small-diameter in-

ner curved piece 5a and a large-diameter outer curved piece 5b, and the inner curved piece 5a and the outer curved piece 5b are connected by a lower curved part 5c and an upper curved part 5d. In the spring member 5 of the present embodiment, the upper curved part 5d is integrally connected to the cover part 24, and the upper curved part 5d functions as a fixed part to be fixed and held to the cover part 24. Further, a projection 5e is provided on a lower part of the outer curved piece 5b so as to project outward and enter the inside of the recess part 4d, and thus abut against the inclined surface 4e at its distal end.

[0021] The shroud 6 covers most of the sprayer main body 2, and the upper parts of the operation lever 4 and the spring member 5. The shroud 6 of the present embodiment is slid frontward from backward with respect to the sprayer main body 2 to be fitted and held into the sprayer main body 2.

[0022] In the trigger-type liquid sprayer 1 having such a configuration, when a finger is put on the lever main body part 4a to apply force backward, the operation lever 4 swings backward around the swing center C, and the piston member 23 moves backward by the connection shaft part 4c inserted into the connection recess part 23a. At this time, the projection 5e that abuts against the inclined surface 4e moves backward as shown by broken lines in Fig. 1. Consequently, the spring member 5 is elastically deformed so that the inner curved piece 5a and the outer curved piece 5b are bent. On the other hand, when the application of the force to the lever main body part 4a is released, the spring member 5 having been elastically deformed is restored and the restoring force at that time acts on the inclined surface 4e via the projection 5e. As a result, the operation lever 4 swings forward around the swing center C and the piston member 23 moves forward. As described above, by repeatedly applying and releasing the force to the lever main body part 4a, the piston member 23 can move in the front-back direction to actuate the pump, and the content liquid stored in the container A can be sprayed from the spray port of the nozzle 3.

[0023] Meanwhile, when the operation lever 103 is swung in the front-back direction in the conventional trigger-type liquid sprayer 100 shown in Fig. 3, the back end part of the lever-side projection 106 abuts against the front wall of the spring-side projection 105, and thus the spring-side projection 105 moves in the front-back direction together with the lever-side projection 106. Assuming that the amount of a swing movement of the operation lever 103 in the front-back direction is denoted by L1, and the amount of movement of the spring-side projection 105 in the front-back direction is denoted by L3.

[0024] On the other hand, when the operation lever 4 is swung in the front-back direction in the trigger-type liquid sprayer 1 shown in Fig. 1, the projection 5e abutting against the inclined surface 4e moves backward together with the inclined surface 4e while moving relatively forward with respect to the inclined surface 4e. That is to say, if the operation lever 4 is swung by the amount L1 of movement in the front-back direction like the trigger-type liquid sprayer 100 shown in Fig. 3, the amount L2 of movement of the projection 5e in the front-back direction is smaller than the amount L3 of movement of the spring-side projection 105 in the front-back direction shown in Fig. 3. Consequently, in the trigger-type liquid sprayer 1 according to the present invention, the spring member 5 can be less fatigued than in the conventional trigger-type liquid sprayer 100. As the amount of deformation of the spring member 5 is reduced, the force required to swing the operation lever 4 backward can also be reduced.

[0025] While the specific embodiment of the trigger-type liquid sprayer according to the present invention has been described above, the trigger-type liquid sprayer according to the present invention is not limited to the above-described embodiment, and also includes various modifications made within the scope of the claims. For example, the inclined surface 4e is described as a curved inclined surface that curves in the direction away from the projection 5e in the present embodiment. However, for example, the inclined surface 4e may be curved in a direction approaching the projection 5e, or may be curved in an S shape obtained by combining these curves. Alternatively, the inclined surface 4e does not need to be curved, and may be a straight inclined surface. Further, the structures of the internal passage through which a content liquid passes and the pump provided in the sprayer main body 2 are not limited to those in the above-described embodiment, and other structures may be employed.

Reference Signs List

[0026]

1	trigger-type liquid sprayer
2	sprayer main body
3	nozzle
4	operation lever
4a	lever main body part
4b	shaft part
4c	connection shaft part
4d	recess part
4e	inclined surface
5	spring member
5a	inner curved piece
5b	outer curved piece
5c	lower curved part
5d	upper curved part (fixed part)
5e	projection
21	attachment cap
22	passage part
22a	vertical cylinder part
22b	horizontal cylinder part
22c	cylindrical part
23	piston member

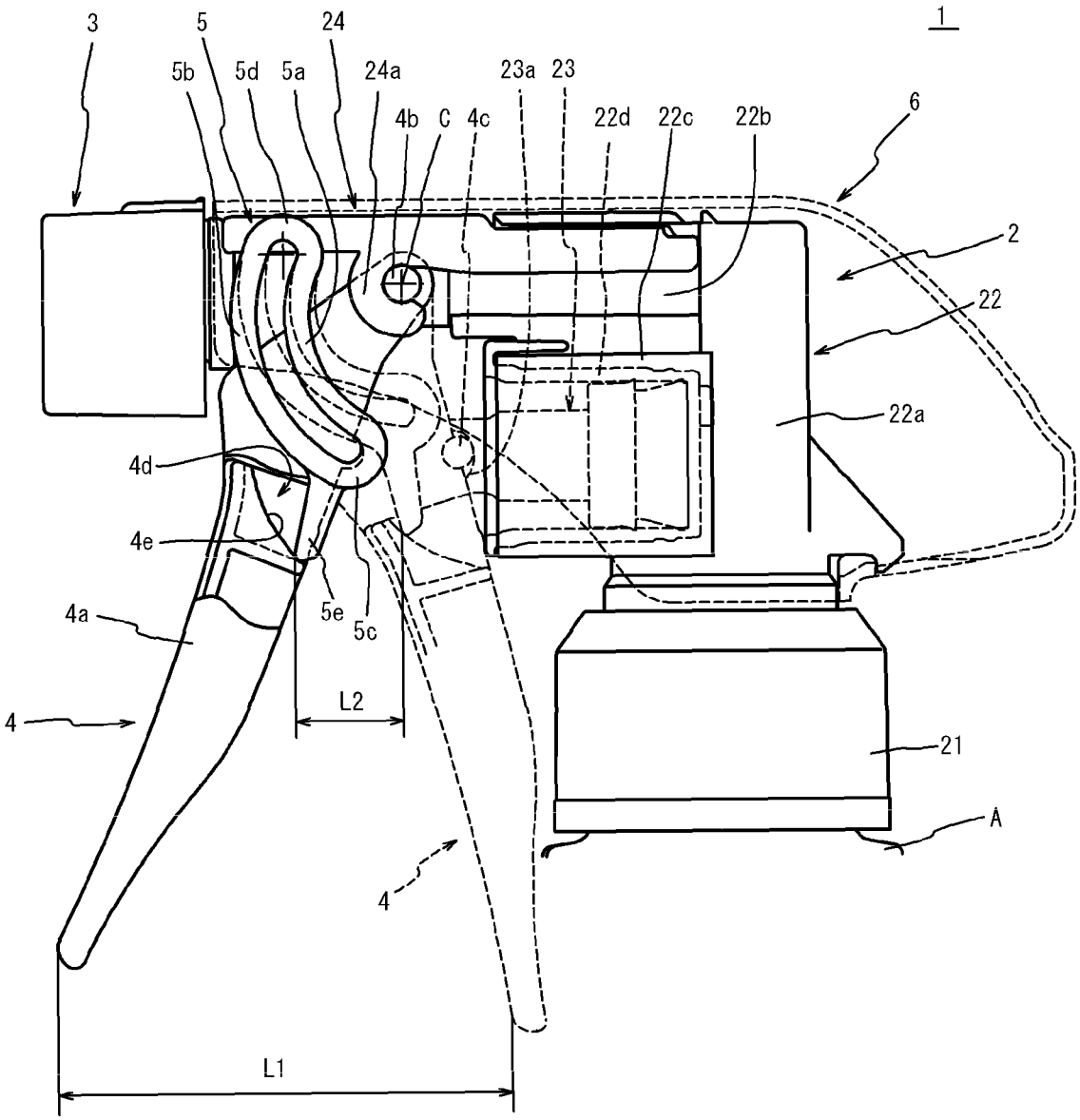
23a connection recess part
24 cover part
24a bearing part
A container
C swing center

Claims

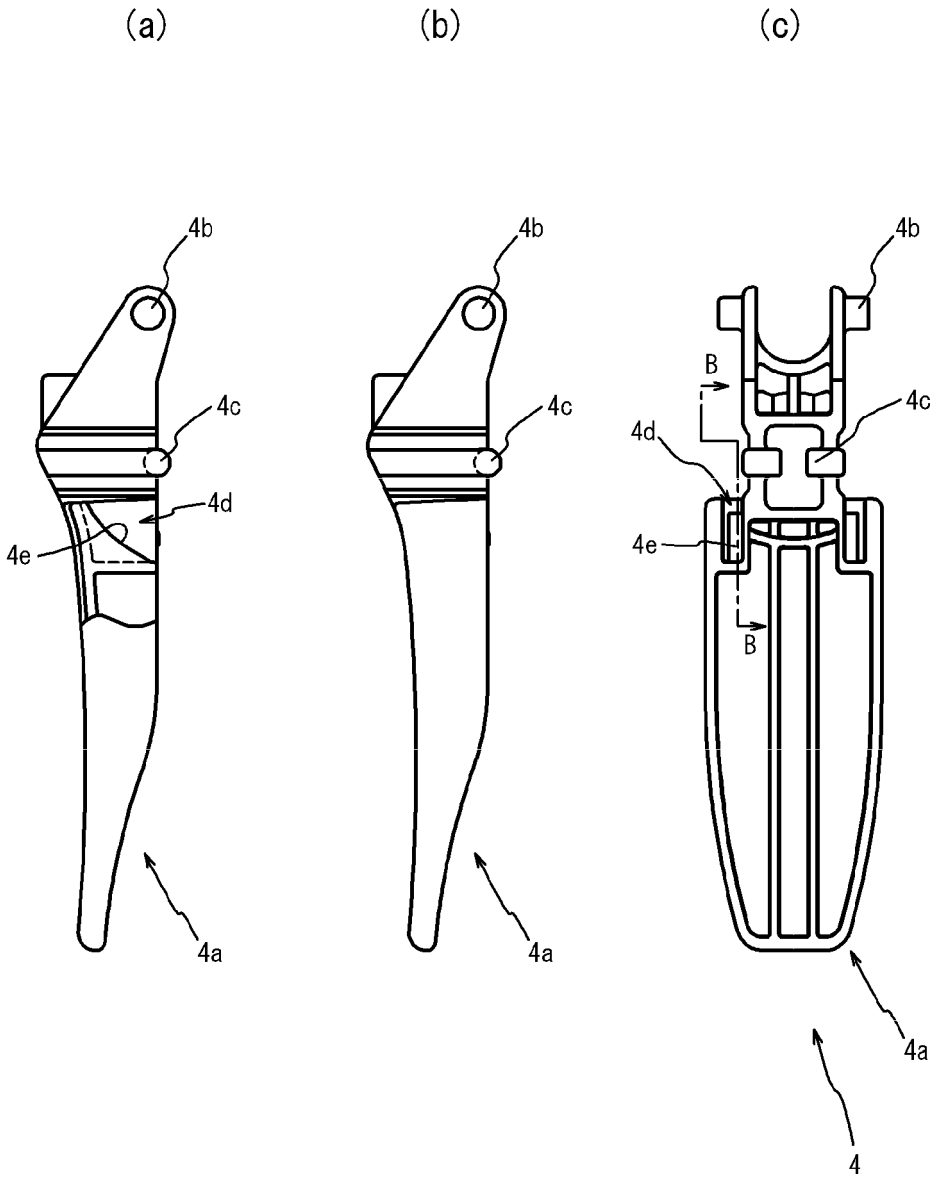
1. A trigger-type liquid sprayer comprising: a sprayer main body attached to a container; an operation lever held to be swingable in a front-back direction with respect to the sprayer main body; and a spring member urging the operation lever forward, the trigger-type liquid sprayer sucking, pressurizing, and pumping a content liquid stored in the container to spray the content liquid to outside by swinging the operation lever in the front-back direction so as to actuate a pump provided in the sprayer main body, wherein the spring member includes a fixed part that is located in front of a swing center of the operation lever and is fixed and held to the sprayer main body, and a projection that is located below the fixed part, and the operation lever includes an inclined surface that is inclined upward from downward and frontward from backward and is urged by the projection abutting against the inclined surface.

2. The trigger-type liquid sprayer according to claim 1, wherein the inclined surface is a curved inclined surface that is curved in a direction away from the projection.

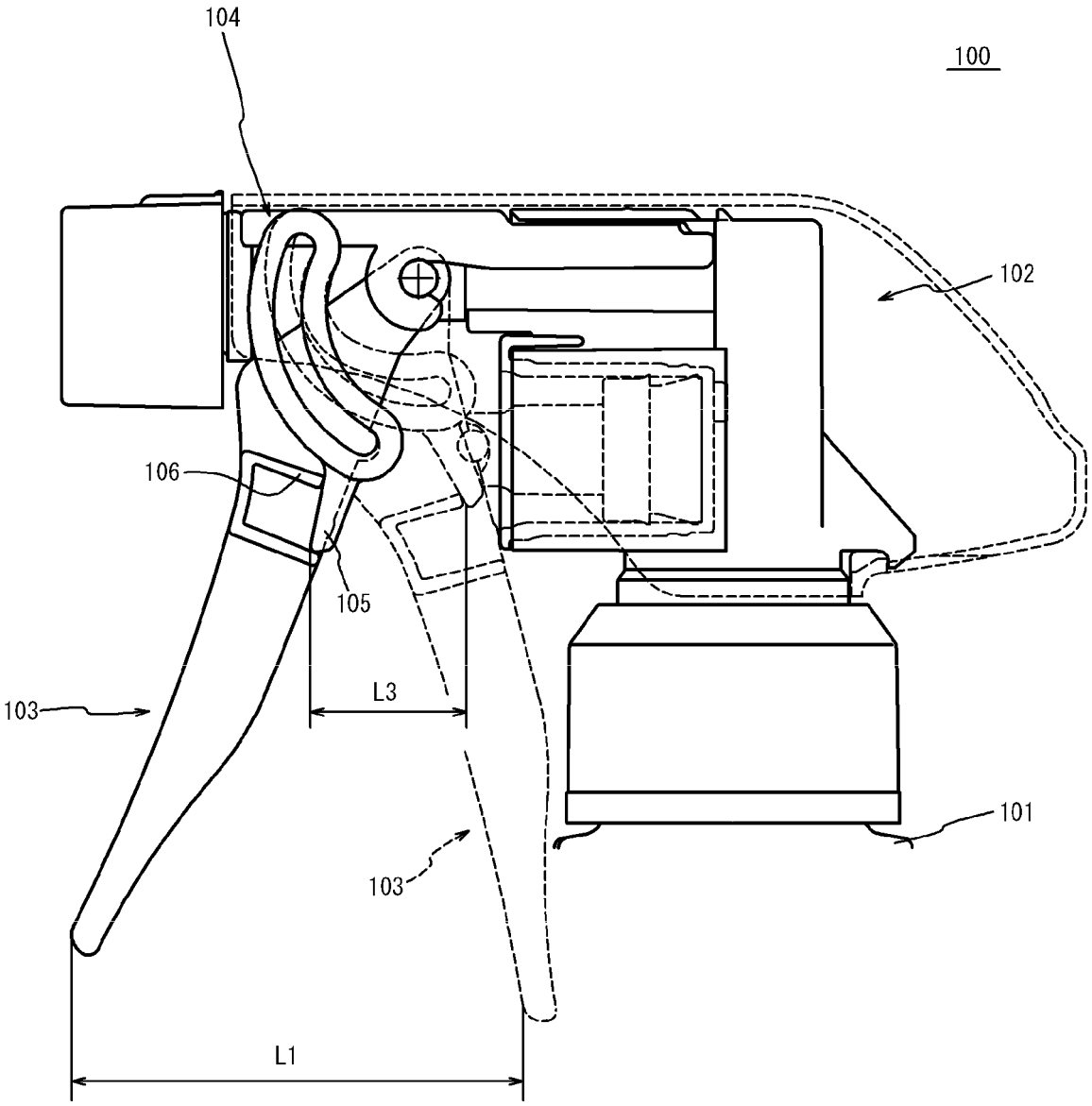
[Fig. 1]


3
5
24
1
5b
5d
5a
24a
23a
23
4b
C
4c
22d
22c
22b
6
2
22
22a
4d
4e
5e
5c
4a
L2
4
21
A
4
L1

[Fig. 2]



[Fig. 3]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/030881

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl. B05B11/00(2006.01)i, B65D47/34(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl. B05B11/00, B65D47/34

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2018
Registered utility model specifications of Japan 1996-2018
Published registered utility model applications of Japan 1994-2018

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2009-297650 A (KAO CORPORATION) 24 December 2009, claims, paragraph [0016], fig. 1 (Family: none)	1
A	JP 2017-132518 A (YOSHINO KOGYOSHO CO., LTD.) 03 August 2017, whole document (Family: none)	1-2
A	JP 2015-47552 A (YOSHINO KOGYOSHO CO., LTD.) 16 March 2015, whole document (Family: none)	1-2

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/030881

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2015-63345 A (YOSHINO KOGYOSHO CO., LTD.) 09 April 2015, whole document & US 2017/0014844 A1 & WO 2015/129268 A1 & EP 3112286 A1 & CA 2941007 A & CN 106029514 A & KR 10-2016-0114169 A	1-2
A	JP 2015-62886 A (YOSHINO KOGYOSHO CO., LTD.) 09 April 2015, whole document (Family: none)	1-2
A	JP 2015-66539 A (YOSHINO KOGYOSHO CO., LTD.) 13 April 2015, whole document (Family: none)	1-2

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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